

# Exhibit LL

## Exhibit D-16

**Invalidity of U.S. Patent No. 6,922,632 (“’632 Patent”)<sup>1</sup> Under Pre-AIA Section 102 or Section 103 in view of InterSense IS-900 Precision Motion Tracking System and InterSense IS-900 Studio Camera Tracker (collectively, “InterSense IS-900”)<sup>2</sup>**

InterSense IS-900 was released in August 9, 1999. Plaintiffs belatedly asserted a priority date of June 13, 2001 for the ’632 Patent on December 22, 2021, 71 days after the Court’s deadline. Defendants have reviewed Plaintiffs’ alleged evidence of the purported June 13, 2001 priority date, and maintain that the ’632 Patent is not entitled to this priority date. *See* Defendants’ March 15, 2022 Supplemental Invalidity Contentions. Defendants reserve their objections to Plaintiffs’ belated assertion of the new priority date and expressly reserve all rights to challenge this alleged new priority date. As such, Defendants assume for the sake of these invalidity contentions, that the priority date for the ’632 Patent is August 9, 2002 based on the first filed Provisional Application from which the ’632 Patent claims priority. (Defendants do not concede nor agree that Plaintiffs are even entitled to this date.) Assuming this priority date, InterSense IS-900 qualifies as prior art under at least pre-AIA Sections 102(a) and (b) to the ’068 Patent.

As described herein, the asserted claims of the ’632 Patent are invalid (a) under one or more sections of 35 U.S.C. § 102 as anticipated expressly or inherently by InterSense IS-900 (including the documents incorporated into InterSense IS-900 by reference) and (b) under 35 U.S.C. § 103 as obvious in view of InterSense IS-900 standing alone and, additionally, in combination with the knowledge of one of ordinary skill in the art, and/or other prior art, including but not limited to the prior art identified in Defendants’ Invalidity Contentions and the prior art described in the claim charts attached in Exhibits D-1 – D-22. With respect to the proposed modifications to InterSense IS-900, as of the priority date of the ’632 Patent, such modification would have been obvious to try, an obvious combination of prior art elements according to known

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<sup>1</sup> Discovery in this case is ongoing and, accordingly, this invalidity chart is not to be considered final. Defendants have conducted the invalidity analysis herein without having fully undergone claim construction and a *Markman* hearing. By charting the prior art against the claim(s) herein, Defendants are not admitting nor agreeing to Plaintiffs’ interpretation of the claims at issue in this case. Additionally, these charts provide representative examples of portions of the charted references that disclose the indicated limitations under Plaintiffs’ application of the claims; additional portions of these references other than the representative examples provided herein may also disclose the indicated limitation(s) and Defendants contend that the asserted claim(s) are invalid in light of the charted reference(s) as a whole. Defendants reserve the right to rely on additional citations or sources of evidence that also may be applicable, or that may become applicable in light of claim construction, changes in Plaintiffs’ infringement contentions, and/or information obtained during discovery as the case progresses. Further, by submitting these invalidity contentions, Defendants do not waive and hereby expressly reserve their right to raise other invalidity defenses, including but not limited to defenses under Sections 101 and 112. Defendants reserve the right to amend or supplement this claim chart at a later date, including after the Court’s order construing disputed claim terms.

<sup>2</sup> The claim limitations described herein were disclosed by the InterSense IS-900 as of the earliest priority date of the ’632 patent. For instance: *InterSense Introduces the IS-900 Series of Precision Motion Trackers*, INTERSENSE (Aug. 9, 1999), <https://web.archive.org/web/20010221092911/http://www.isense.com/news/pr/1999/IS900.htm> (“InterSense IS-900 Ex. 1”); *Technical Overview IS-900 Motion Tracking System*, INTERSENSE, <http://www.5dt.com/downloads/3rdparty/IS900TechOverviewEng.pdf> (“InterSense IS-900 Ex. 2”); InterSense IS-900 Systems, INTERSENSE, (earliest revision date Feb. 19, 2004) <https://web.archive.org/web/20040219211135/http://www.isense.com/products/prec/is900/IS900.pdf> (“InterSense IS-900 Ex. 3”); Wormell, et. al, *Unified Camera, Content and Talent Tracking in Digital Television and Movie Production*, NATIONAL ASSOCIATION OF BROADCASTERS SHOW (April 8-13, 2000), [https://web.archive.org/web/20060322184144/http://www.isense.com/company/papers/Unified\\_Studio\\_Tracking.pdf](https://web.archive.org/web/20060322184144/http://www.isense.com/company/papers/Unified_Studio_Tracking.pdf) (“InterSense IS-900 Ex. 4”).

## Exhibit D-16

methods to yield predictable results, a simple substitution of one known element for another to obtain predictable results, a use of known techniques to improve a similar devices or method in the same way, an application of a known technique to a known device or method ready for improvement to yield predictable results, a variation of a known work in one field of endeavor for use in either the same field or a different one based on design incentives or other market forces with variations that are predictable to one of ordinary skill in the art, and/or obvious in view of teachings, suggestions, and motivations in the prior art that would have led one of ordinary skill to modify or combine the prior art references. All cross-references should be understood to include material that is cross-referenced within the cross-reference. Where a particular figure is cited, the citation should be understood to encompass the caption and description of the figure as well as any text relating to or describing the figure. Conversely, where particular text referring to a figure is cited, the citation should be understood to include the figure as well.

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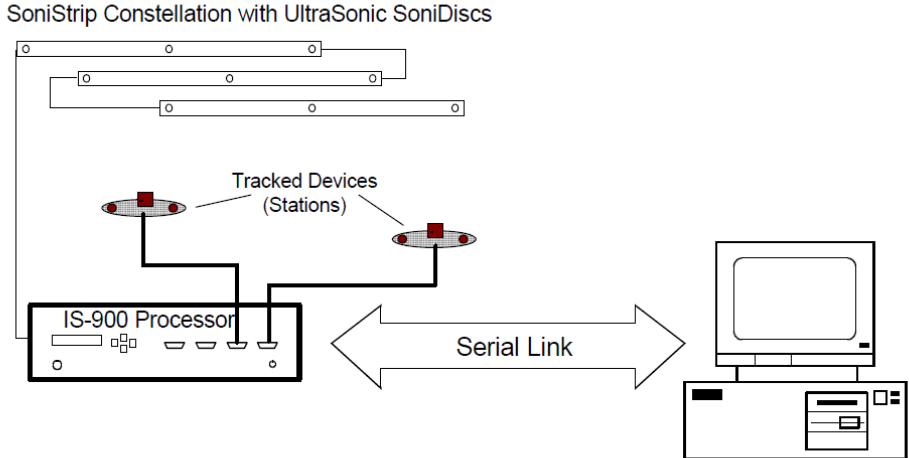
**A. INDEPENDENT CLAIM 1**

| <b>CLAIM 1</b>                                      | <b>InterSense IS-900</b>   |
|---|--|
| [1.pre] A method for tracking an object comprising: | <p>At least under Plaintiffs' apparent infringement theory, InterSense IS-900 discloses, either expressly or inherently, a method for tracking an object.</p> <p>No party has yet asserted that the preamble is limiting, nor has the Court construed the preamble as limiting. However, to the extent that the preamble is limiting, it is disclosed by InterSense IS-900.</p> <p>In the alternative, this element would be obvious over InterSense IS-900 in light of the other references disclosed in Defendants' Invalidity Contentions and/or the knowledge of one of ordinary skill in the art.</p> <p><i>See, e.g.:</i></p> <p>The IS-900 product line represents a breakthrough in precision motion tracking for all types of immersive 3D environments. Based on patent-pending Constellation™ technology and proprietary SensorFusion software, the IS-900 series consists of four application specific products that deliver precise and accurate wide-area, interference-free, head, hand and object tracking for the most demanding immersive graphics applications.</p> |

## Exhibit D-16

| CLAIM 1 | InterSense IS-900  |
|---------|--|
|         | <p>The IS-900 architecture uses InterSense's SensorFusion software to combine the latest advances in inertial and ultrasonic tracking technology to deliver tracking resolution in the millimeter range for position and below a degree for orientation. Together, the hybrid solution achieves superior performance, resolution and robustness while virtually eliminating the drift, jitter and lag found in other motion tracking systems. The IS-900 features a modular Constellation architecture, which provides unlimited range, intelligent sensor networking for easy expansion and ergonomically designed hand-held stylus, joystick and integrated 3D glasses tracker for comfortable, high-performance head and hand tracking.</p> <p>"The IS-900 architecture series delivers the most precise, real-time, multi-point tracking on the market for even the most complex immersive graphics applications," Charlie Miller, president and CEO of InterSense, said.</p> <p>The IS-900 line also offers an easily installed system, auto-calibration hardware and software, and wide software support and backward compatibility with InterSense's present products. From CAVEs™, ImmersaDesks™ and PowerWalls™, to rooms, buildings and production studios, the IS-900 product line provides the ideal precision motion tracking solution for any immersive application.</p> <p>InterSense IS-900 Ex. 1.</p> |

## Exhibit D-16


| CLAIM 1 | InterSense IS-900   |
|---------|---|
|         | <p><b>System Components &amp; Configuration</b></p> <p>Figure 1 illustrates the configuration of the hybrid inertial-acoustic tracking system. The IS-900 hardware is made up of SoniStrips™, Tracked Devices or Stations, and the Processor Unit. The drawing illustrates the IS-900 being used to track two inertial/acoustic devices. The SoniStrip constellation transmits 40 kHz ultrasonic signals that are received by the tracked devices. The inertial component in the tracked station calculates orientation and position updates. The acoustic components prevent drift accumulation to provide full 6-DOF data sent out via an RS-232 connection.</p>  <p style="text-align: center;"><b>Figure 1 – IS-900 HW diagram</b></p> <p>InterSense IS-900 Ex. 2 at 2.</p> |

## Exhibit D-16

## CLAIM 1

## InterSense IS-900

## InterSense IS-900 Systems




### Precision 6-DOF Motion Tracking

- *Interference free, wide area motion tracking for:*
  - Simulation and training systems
  - Immersive and Head Mounted Displays
  - CAVE<sup>(tm)</sup>s, Power Walls, Reality Centers
  - Visualization Systems
  - Augmented and Mixed Reality Systems
- *Flexible configuration options*
- *Wireless tracked devices*
- *SDK for OEM applications on Windows, Linux and IRIX platforms*
- *Windows software provides simple configuration and network interface*


InterSense IS-900 Ex. 3.

## Exhibit D-16

| CLAIM 1  | InterSense IS-900  |
|--|--|
|  | <p style="text-align: center;"><b>Figure 1 – SoniStrips™</b></p> <p>To track the camera and its lens information, an integrated tracking head (Figure 2) mounted on a local camera rail system with lens encoders uses a miniaturized inertial sensor (Figure 3) fused in firmware with a set of three ultrasonic receiver modules (URMs).</p>  <p style="text-align: center;"><b>Figure 2 - Inertial/Acoustic Tracking Head</b></p> <p>InterSense IS-900 Ex. 4 at 2.</p> <p><i>See also</i> Defendants' Invalidity Contentions for further discussion.</p> |
| [1.a] coupling a sensor subsystem to an estimation subsystem, said sensor subsystem enabling measurement | At least under Plaintiffs' apparent infringement theory, InterSense IS-900 discloses, either expressly or inherently, coupling a sensor subsystem to an estimation subsystem, said sensor subsystem enabling measurement related to relative locations or orientations of sensing elements. In the alternative, this element would be obvious over   |



## Exhibit D-16

| CLAIM 1  | InterSense IS-900  |
|--|--|
| related to relative locations or orientations of sensing elements; | <p>InterSense IS-900 in light of the other references disclosed in Defendants' Invalidity Contentions and/or the knowledge of one of ordinary skill in the art.</p> <p><i>See, e.g.:</i></p> <p><b>Brief Introduction &amp; Synopsis of the Operation of the IS-900</b></p> <p>The InterSense IS-900 Motion Tracking System, commercially introduced in 1999, was developed in conjunction with a Navy SBIR program. To date, there are over 500 IS-900 systems in the field today with the majority of applications found in the military sector (flight simulators, weapon training systems, etc.), industry (oil &amp; gas, automotive) and university research labs.</p> <p>The system is a 6 degree of freedom motion (6-DOF) tracking system based on a hybrid technology of inertia and ultrasonic tracking. The position and orientation of the tracking stations are determined by the output of the accelerometers and gyros. Drift correction is accomplished in our advanced kalman filter by fusing the output of the inertial sensors with range measurements obtained from the ultrasonic components. The result is full 6-DOF data that is very smooth, precise, and free from jitter.</p> <p>InterSense IS-900 Ex. 2 at 1.</p> <p>The tracking head determines the absolute position &amp; orientation of the camera and combines this data with the zoom, focus and iris information for transmission to a rack mounted processor (Figure 4 - IS-900 Base Unit).</p>  <p><b>Figure 4 - IS-900 SCT Processor</b></p> <p>InterSense IS-900 Ex. 4 at 2.</p> |



## Exhibit D-16

| CLAIM 1  | InterSense IS-900   |
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|  | <i>See also</i> Defendants' Invalidity Contentions for further discussion.  |
| [1.b] accepting configuration data from the sensor subsystem;  | <p>At least under Plaintiffs' apparent infringement theory, InterSense IS-900 discloses, either expressly or inherently, accepting configuration data from the sensor subsystem. In the alternative, this element would be obvious over InterSense IS-900 in light of the other references disclosed in Defendants' Invalidity Contentions and/or the knowledge of one of ordinary skill in the art.</p> <p><i>See also</i> Defendants' Invalidity Contentions for further discussion.</p>  |
| [1.c] configuring the estimation system according to the accepted configuration data;  | <p>At least under Plaintiffs' apparent infringement theory, InterSense IS-900 discloses, either expressly or inherently, configuring the estimation system according to the accepted configuration data. In the alternative, this element would be obvious over InterSense IS-900 in light of the other references disclosed in Defendants' Invalidity Contentions and/or the knowledge of one of ordinary skill in the art.</p> <p><i>See also</i> Defendants' Invalidity Contentions for further discussion.</p>  |
| [1.d] repeatedly updating a state estimate, including accepting measurement information from the sensor subsystem, and updating the state estimate according to the accepted configuration data and the accepted measurement data. | <p>At least under Plaintiffs' apparent infringement theory, InterSense IS-900 discloses, either expressly or inherently, repeatedly updating a state estimate, including accepting measurement information from the sensor subsystem, and updating the state estimate according to the accepted configuration data and the accepted measurement data. In the alternative, this element would be obvious over InterSense IS-900 in light of the other references disclosed in Defendants' Invalidity Contentions and/or the knowledge of one of ordinary skill in the art.</p> <p><i>See also</i> Defendants' Invalidity Contentions for further discussion.</p> |

## Exhibit D-16

**B. DEPENDENT CLAIM 2**

| CLAIM 2   | InterSense IS-900   |
|---|---|
| <p>[2] The method of claim 1 wherein coupling the sensor subsystem to the estimation subsystem includes coupling software modules each associated with one or more of the sensing elements.</p> | <p>At least under Plaintiffs' apparent infringement theory, InterSense IS-900 discloses, either expressly or inherently, the method of claim 1 wherein coupling the sensor subsystem to the estimation subsystem includes coupling software modules each associated with one or more of the sensing elements. In the alternative, this element would be obvious over InterSense IS-900 in light of the other references disclosed in Defendants' Invalidity Contentions and/or the knowledge of one of ordinary skill in the art.</p> <p><i>See</i> Disclosures with respect to Claim 1, <i>supra</i>; <i>see also</i> Defendants' Invalidity Contentions for further discussion.</p> |

**C. DEPENDENT CLAIM 5**

| CLAIM 5  | InterSense IS-900   |
|--|---|
| <p>[5] The method of claim 1 wherein the state estimate characterizes an estimate of a location of the object.</p> | <p>At least under Plaintiffs' apparent infringement theory, InterSense IS-900 discloses, either expressly or inherently, the method of claim 1 wherein the state estimate characterizes an estimate of a location of the object. In the alternative, this element would be obvious over InterSense IS-900 in light of the other references disclosed in Defendants' Invalidity Contentions and/or the knowledge of one of ordinary skill in the art.</p> <p><i>See, e.g.:</i></p> |

## Exhibit D-16

| CLAIM 5 | InterSense IS-900   |
|---------|---|
|         | <p><b>Brief Introduction &amp; Synopsis of the Operation of the IS-900</b></p> <p>The InterSense IS-900 Motion Tracking System, commercially introduced in 1999, was developed in conjunction with a Navy SBIR program. To date, there are over 500 IS-900 systems in the field today with the majority of applications found in the military sector (flight simulators, weapon training systems, etc.), industry (oil &amp; gas, automotive) and university research labs.</p> <p>The system is a 6 degree of freedom motion (6-DOF) tracking system based on a hybrid technology of inertia and ultrasonic tracking. The position and orientation of the tracking stations are determined by the output of the accelerometers and gyros. Drift correction is accomplished in our advanced kalman filter by fusing the output of the inertial sensors with range measurements obtained from the ultrasonic components. The result is full 6-DOF data that is very smooth, precise, and free from jitter.</p> <p>Advantages of the IS-900 technology include:</p> <ul style="list-style-type: none"> <li>- Immune to metallic, acoustic, and optical interference</li> <li>- Sensor design eliminates acoustic transmitter “line of sight” blockage</li> <li>- Consistent accuracy over entire tracking volume</li> <li>- Applications range in size from small cockpit simulators to large broadcast studios</li> <li>- One-time system calibration performed during initial installation with accurate position mapping of acoustic transmitters</li> <li>- Superior motion prediction algorithms</li> <li>- Wireless tracking devices</li> <li>- Integration of tracking devices into OEM applications</li> </ul> <p><b>InterSense IS-900 Ex. 2 at 1.</b></p> <p>Tracking systems are being installed in a wide variety of environments including large spaces for studio, museum and entertainment applications down to small cockpit or desktop environments for flight simulators, design workstations or virtual training applications.</p> <p>While the SoniStrip array addresses most standard immersive display applications, a modular approach to the ultrasonic array is desired to cover a larger range of tracking applications. With a typical installation of SoniStrips in a large room environment, the SoniStrips are mounted in a grid pattern on the ceiling, spaced roughly 1 meter apart. Once installed, the full array is measured with an optical sighting tool (“Total Station”) to determine the exact location of each beacon. These measured coordinates are downloaded into the IS-900 processor to establish a tracking constellation reference for the environment.</p> <p><b>InterSense IS-900 Ex. 2 at 9.</b></p> <p><i>See Disclosures with respect to Claim 1, supra; see also Defendants’ Invalidity Contentions for further discussion.</i></p> |

## Exhibit D-16

**D. DEPENDENT CLAIM 6**

| CLAIM 6  | InterSense IS-900   |
|--|---|
| [6] The method of claim 1 wherein the state estimate characterizes configuration information for one or more sensing elements fixed to the object. | <p>At least under Plaintiffs' apparent infringement theory, InterSense IS-900 discloses, either expressly or inherently, the method of claim 1 wherein the state estimate characterizes configuration information for one or more sensing elements fixed to the object. In the alternative, this element would be obvious over InterSense IS-900 in light of the other references disclosed in Defendants' Invalidity Contentions and/or the knowledge of one of ordinary skill in the art.</p> <p><i>See</i> Disclosures with respect to Claim 1, <i>supra</i>; <i>see also</i> Defendants' Invalidity Contentions for further discussion.</p> |

**E. DEPENDENT CLAIM 7**

| CLAIM 7   | InterSense IS-900  |
|---|--|
| [7] The method of claim 6 wherein the configuration information for the one or more sensing elements fixed to the object includes information related to position or orientation of said sensing elements relative to the object. | <p>At least under Plaintiffs' apparent infringement theory, InterSense IS-900 discloses, either expressly or inherently, the method of claim 6 wherein the configuration information for the one or more sensing elements fixed to the object includes information related to position or orientation of said sensing elements relative to the object. In the alternative, this element would be obvious over InterSense IS-900 in light of the other references disclosed in Defendants' Invalidity Contentions and/or the knowledge of one of ordinary skill in the art.</p> <p><i>See</i> Disclosures with respect to Claim 6, <i>supra</i>; <i>see also</i> Defendants' Invalidity Contentions for further discussion.</p> |

## Exhibit D-16

**F. DEPENDENT CLAIM 8**

| CLAIM 8   | InterSense IS-900   |
|---|---|
| <p>[8] The method of claim 6 wherein the configuration information for the one or more sensing elements fixed to the object includes operational parameters for the one or more sensing elements.</p> | <p>At least under Plaintiffs' apparent infringement theory, InterSense IS-900 discloses, either expressly or inherently, the method of claim 6 wherein the configuration information for the one or more sensing elements fixed to the object includes operational parameters for the one or more sensing elements. In the alternative, this element would be obvious over InterSense IS-900 in light of the other references disclosed in Defendants' Invalidity Contentions and/or the knowledge of one of ordinary skill in the art.</p> <p><i>See</i> Disclosures with respect to Claim 6, <i>supra</i>; <i>see also</i> Defendants' Invalidity Contentions for further discussion.</p> |

**G. DEPENDENT CLAIM 24**

| CLAIM 24  | InterSense IS-900   |
|---|---|
| <p>[24] The method of claim 1 wherein updating the state estimate includes applying a Kalman Filter approach.</p> | <p>At least under Plaintiffs' apparent infringement theory, InterSense IS-900 discloses, either expressly or inherently, the method of claim 1 wherein updating the state estimate includes applying a Kalman Filter approach. In the alternative, this element would be obvious over InterSense IS-900 in light of the other references disclosed in Defendants' Invalidity Contentions and/or the knowledge of one of ordinary skill in the art.</p> <p><i>See, e.g.:</i></p> |

## Exhibit D-16

| CLAIM 24 | InterSense IS-900   |
|----------|---|
|          | <p><b>Brief Introduction &amp; Synopsis of the Operation of the IS-900</b></p> <p>The InterSense IS-900 Motion Tracking System, commercially introduced in 1999, was developed in conjunction with a Navy SBIR program. To date, there are over 500 IS-900 systems in the field today with the majority of applications found in the military sector (flight simulators, weapon training systems, etc.), industry (oil &amp; gas, automotive) and university research labs.</p> <p>The system is a 6 degree of freedom motion (6-DOF) tracking system based on a hybrid technology of inertia and ultrasonic tracking. The position and orientation of the tracking stations are determined by the output of the accelerometers and gyros. Drift correction is accomplished in our advanced kalman filter by fusing the output of the inertial sensors with range measurements obtained from the ultrasonic components. The result is full 6-DOF data that is very smooth, precise, and free from jitter.</p> <p>Advantages of the IS-900 technology include:</p> <ul style="list-style-type: none"> <li>- Immune to metallic, acoustic, and optical interference</li> <li>- Sensor design eliminates acoustic transmitter “line of sight” blockage</li> <li>- Consistent accuracy over entire tracking volume</li> <li>- Applications range in size from small cockpit simulators to large broadcast studios</li> <li>- One-time system calibration performed during initial installation with accurate position mapping of acoustic transmitters</li> <li>- Superior motion prediction algorithms</li> <li>- Wireless tracking devices</li> <li>- Integration of tracking devices into OEM applications</li> </ul> <p>InterSense IS-900 Ex. 2 at 1.</p> <p><i>See Disclosures with respect to Claim 1, supra; see also Defendants’ Invalidity Contentions for further discussion.</i></p> |

**H. DEPENDENT CLAIM 25**

| CLAIM 25   | InterSense IS-900   |
|--|---|
| [25] The method of claim 1 wherein each of said sensing elements | At least under Plaintiffs’ apparent infringement theory, InterSense IS-900 discloses, either expressly or inherently, the method of claim 1 wherein each of said sensing elements comprises at least one of a sensor and a target. In the |

## Exhibit D-16

| CLAIM 25   | InterSense IS-900   |  |  |            |            |                          |                   |                   |                   |                       |                   |                   |                   |                    |    |    |    |                         |                     |                     |                     |                        |     |     |     |                     |  |  |  |           |            |            |            |                   |                                |  |  |                                    |          |              |              |
|--|---|--|--|------------|------------|--------------------------|-------------------|-------------------|-------------------|-----------------------|-------------------|-------------------|-------------------|--------------------|----|----|----|-------------------------|---------------------|---------------------|---------------------|------------------------|-----|-----|-----|---------------------|--|--|--|-----------|------------|------------|------------|-------------------|--------------------------------|--|--|------------------------------------|----------|--------------|--------------|
| comprises at least one of a sensor and a target. | <p>alternative, this element would be obvious over InterSense IS-900 in light of the other references disclosed in Defendants’ Invalidity Contentions and/or the knowledge of one of ordinary skill in the art.</p> <p><i>See, e.g.:</i></p> <p>The IS-900 architecture uses InterSense's SensorFusion software to combine the latest advances in inertial and ultrasonic tracking technology to deliver tracking resolution in the millimeter range for position and below a degree for orientation. Together, the hybrid solution achieves superior performance, resolution and robustness while virtually eliminating the drift, jitter and lag found in other motion tracking systems. The IS-900 features a modular Constellation architecture, which provides unlimited range, intelligent sensor networking for easy expansion and ergonomically designed hand-held stylus, joystick and integrated 3D glasses tracker for comfortable, high-performance head and hand tracking.</p> <p>"The IS-900 architecture series delivers the most precise, real-time, multi-point tracking on the market for even the most complex immersive graphics applications," Charlie Miller, president and CEO of InterSense, said.</p> <p>InterSense IS-900 Ex. 1.</p> <div><div>IS-900 Product Configurations</div><table><tr><th>Product Features</th><th>IS-900 SimTracker</th><th>IS-900 VWT</th><th>IS-900 VET</th></tr><tr><td>Standard Tracking Volume</td><td>1.5 x 1.5 x 2.0 m</td><td>2.0 x 1.5 x 3.0 m</td><td>3.0 x 3.0 x 3.0 m</td></tr><tr><td>Maximum Tracking Area</td><td>20 m<sup>2</sup></td><td>20 m<sup>2</sup></td><td>72 m<sup>2</sup></td></tr><tr><td>Maximum SoniStrips</td><td>12</td><td>12</td><td>48</td></tr><tr><td>Maximum Tracked Devices</td><td>4 MiniTrax Trackers</td><td>4 MiniTrax Trackers</td><td>4 MiniTrax Trackers</td></tr><tr><td>Upgradable to Wireless</td><td>Yes</td><td>Yes</td><td>Yes</td></tr><tr><td colspan="4">Standard Components</td></tr><tr><td>Processor</td><td>IS-900 VWT</td><td>IS-900 VWT</td><td>IS-900 VET</td></tr><tr><td>Tracked Device(s)</td><td>MiniTrax Head Tracking Station</td><td>MiniTrax Head Tracking Station<br/>Tracked Wand w/ Buttons &amp; Joystick</td><td>MiniTrax Head Tracking Station<br/>Tracked Wand w/ Buttons &amp; Joystick</td></tr><tr><td>Position Referencing Constellation</td><td>SoniWing</td><td>4 SoniStrips</td><td>6 SoniStrips</td></tr></table></div> <p>InterSense IS-900 Ex. 3.</p> | Product Features   | IS-900 SimTracker  | IS-900 VWT | IS-900 VET | Standard Tracking Volume | 1.5 x 1.5 x 2.0 m | 2.0 x 1.5 x 3.0 m | 3.0 x 3.0 x 3.0 m | Maximum Tracking Area | 20 m <sup>2</sup> | 20 m <sup>2</sup> | 72 m <sup>2</sup> | Maximum SoniStrips | 12 | 12 | 48 | Maximum Tracked Devices | 4 MiniTrax Trackers | 4 MiniTrax Trackers | 4 MiniTrax Trackers | Upgradable to Wireless | Yes | Yes | Yes | Standard Components |  |  |  | Processor | IS-900 VWT | IS-900 VWT | IS-900 VET | Tracked Device(s) | MiniTrax Head Tracking Station | MiniTrax Head Tracking Station<br>Tracked Wand w/ Buttons & Joystick | MiniTrax Head Tracking Station<br>Tracked Wand w/ Buttons & Joystick | Position Referencing Constellation | SoniWing | 4 SoniStrips | 6 SoniStrips |
| Product Features                                 | IS-900 SimTracker   | IS-900 VWT   | IS-900 VET   |            |            |                          |                   |                   |                   |                       |                   |                   |                   |                    |    |    |    |                         |                     |                     |                     |                        |     |     |     |                     |  |  |  |           |            |            |            |                   |                                |  |  |                                    |          |              |              |
| Standard Tracking Volume                         | 1.5 x 1.5 x 2.0 m   | 2.0 x 1.5 x 3.0 m  | 3.0 x 3.0 x 3.0 m  |            |            |                          |                   |                   |                   |                       |                   |                   |                   |                    |    |    |    |                         |                     |                     |                     |                        |     |     |     |                     |  |  |  |           |            |            |            |                   |                                |  |  |                                    |          |              |              |
| Maximum Tracking Area                            | 20 m <sup>2</sup>   | 20 m <sup>2</sup>  | 72 m <sup>2</sup>  |            |            |                          |                   |                   |                   |                       |                   |                   |                   |                    |    |    |    |                         |                     |                     |                     |                        |     |     |     |                     |  |  |  |           |            |            |            |                   |                                |  |  |                                    |          |              |              |
| Maximum SoniStrips                               | 12  | 12   | 48   |            |            |                          |                   |                   |                   |                       |                   |                   |                   |                    |    |    |    |                         |                     |                     |                     |                        |     |     |     |                     |  |  |  |           |            |            |            |                   |                                |  |  |                                    |          |              |              |
| Maximum Tracked Devices                          | 4 MiniTrax Trackers   | 4 MiniTrax Trackers  | 4 MiniTrax Trackers  |            |            |                          |                   |                   |                   |                       |                   |                   |                   |                    |    |    |    |                         |                     |                     |                     |                        |     |     |     |                     |  |  |  |           |            |            |            |                   |                                |  |  |                                    |          |              |              |
| Upgradable to Wireless                           | Yes   | Yes  | Yes  |            |            |                          |                   |                   |                   |                       |                   |                   |                   |                    |    |    |    |                         |                     |                     |                     |                        |     |     |     |                     |  |  |  |           |            |            |            |                   |                                |  |  |                                    |          |              |              |
| Standard Components                              |   |  |  |            |            |                          |                   |                   |                   |                       |                   |                   |                   |                    |    |    |    |                         |                     |                     |                     |                        |     |     |     |                     |  |  |  |           |            |            |            |                   |                                |  |  |                                    |          |              |              |
| Processor  | IS-900 VWT  | IS-900 VWT   | IS-900 VET   |            |            |                          |                   |                   |                   |                       |                   |                   |                   |                    |    |    |    |                         |                     |                     |                     |                        |     |     |     |                     |  |  |  |           |            |            |            |                   |                                |  |  |                                    |          |              |              |
| Tracked Device(s)                                | MiniTrax Head Tracking Station  | MiniTrax Head Tracking Station<br>Tracked Wand w/ Buttons & Joystick | MiniTrax Head Tracking Station<br>Tracked Wand w/ Buttons & Joystick |            |            |                          |                   |                   |                   |                       |                   |                   |                   |                    |    |    |    |                         |                     |                     |                     |                        |     |     |     |                     |  |  |  |           |            |            |            |                   |                                |  |  |                                    |          |              |              |
| Position Referencing Constellation               | SoniWing  | 4 SoniStrips   | 6 SoniStrips   |            |            |                          |                   |                   |                   |                       |                   |                   |                   |                    |    |    |    |                         |                     |                     |                     |                        |     |     |     |                     |  |  |  |           |            |            |            |                   |                                |  |  |                                    |          |              |              |



## Exhibit D-16

| CLAIM 25 | InterSense IS-900   |
|----------|---|
|          | <i>See</i> Disclosures with respect to Claim 1, <i>supra</i> ; <i>see also</i> Defendants' Invalidity Contentions for further discussion. |

**I. DEPENDENT CLAIM 28**

| CLAIM 28  | InterSense IS-900  |
|---|--|
| <p>[28] The method of claim 1 wherein the object is selected from a group consisting of a vehicle, a robot, a person, a part of a person, a flying object, a floating object, an underwater moving object, an animal, a camera, a sensing apparatus, a helmet, a tool, a piece of sports equipment, a shoe, a boot, an article of clothing, a personal protective equipment, a rigid object having a dimension between 1 nanometer to 109 meters.</p> | <p>At least under Plaintiffs' apparent infringement theory, InterSense IS-900 discloses, either expressly or inherently, the method of claim 1 wherein the object is selected from a group consisting of a vehicle, a robot, a person, a part of a person, a flying object, a floating object, an underwater moving object, an animal, a camera, a sensing apparatus, a helmet, a tool, a piece of sports equipment, a shoe, a boot, an article of clothing, a personal protective equipment, a rigid object having a dimension between 1 nanometer to 109 meters. In the alternative, this element would be obvious over InterSense IS-900 in light of the other references disclosed in Defendants' Invalidity Contentions and/or the knowledge of one of ordinary skill in the art.</p> <p><i>See</i> Disclosures with respect to Claim 1, <i>supra</i>; <i>see also</i> Defendants' Invalidity Contentions for further discussion.</p> |

## Exhibit D-16

**J. DEPENDENT CLAIM 29**

| CLAIM 29   | InterSense IS-900   |
|--|---|
| <p>[29] The method of claim 1 wherein the state estimate comprises information related to a position or an orientation of the object relative to a reference coordinate frame.</p> | <p>At least under Plaintiffs' apparent infringement theory, InterSense IS-900 discloses, either expressly or inherently, the method of claim 1 wherein the state estimate comprises information related to a position or an orientation of the object relative to a reference coordinate frame. In the alternative, this element would be obvious over InterSense IS-900 in light of the other references disclosed in Defendants' Invalidity Contentions and/or the knowledge of one of ordinary skill in the art.</p> <p><i>See, e.g.:</i></p> <p><b>SoniStrip and SoniWing Mounting and Configuration</b></p> <p>SoniStrips are normally mounted from the ceiling over the desired tracking workspace. To increase the flexibility of this system, the IS-900 has been designed with different sized SoniStrips for mounting in a variety of immersive environments (CAVE, ImmersaDesk, ReaCTor, PowerWall, HoloBench, CUBE, etc.). The user is able to position SoniStrips in most environments, including confined spaces such as virtual workbenches, automobiles, and cockpit simulators. Once installed, the user must calibrate the SoniStrip Constellation by measuring the Cartesian x, y, z coordinates of each SoniStrip and enter this information using the constellation Configuration Utility Program provided with the system. The process of calibration should be performed by a trained technical representative. InterSense provides installation and training upon request.</p> <p>The SoniWing is a fixed constellation of ultrasonic SoniDiscs, which does not require special measurement or calibration. The exact locations of the SoniDiscs are factory calibrated by InterSense and included in the ISDEMO Constellation Configuration Utility Program provided with the system.</p> <p>InterSense IS-900 Ex. 2 at 3.</p> |

## Exhibit D-16

| CLAIM 29 | InterSense IS-900  |
|----------|--|
|          | <p>Tracking systems are being installed in a wide variety of environments including large spaces for studio, museum and entertainment applications down to small cockpit or desktop environments for flight simulators, design workstations or virtual training applications.</p> <p>While the SoniStrip array addresses most standard immersive display applications, a modular approach to the ultrasonic array is desired to cover a larger range of tracking applications. With a typical installation of SoniStrips in a large room environment, the SoniStrips are mounted in a grid pattern on the ceiling, spaced roughly 1 meter apart. Once installed, the full array is measured with an optical sighting tool (“Total Station”) to determine the exact location of each beacon. These measured coordinates are downloaded into the IS-900 processor to establish a tracking constellation reference for the environment.</p> <p>For smaller installations, a fixed, factory calibrated beacon configuration provides a quick and simple way to set-up the tracking volume without the need for surveying. Shown in Figure 11, two fixed constellation configurations are now part of the standard IS-900 systems—the SoniWing, which uses six transmitters to track volumes up to 1.5 x 1.5 x 2 meters, and the SoniFrame, which supports nine ultrasonic transmitters for tracking volumes up to 2.5 x 2.5 x 3 meters.</p> <p>InterSense IS-900 Ex. 2 at 9.</p> <p><i>See</i> Disclosures with respect to Claim 1, <i>supra</i>; <i>see also</i> Defendants’ Invalidity Contentions for further discussion.</p> |

**K. INDEPENDENT CLAIM 47**

| CLAIM 47   | InterSense IS-900   |
|--|---|
| <p>[47] A method of using multiple sensors in a tracking system comprising:</p> <p>providing an estimation module;</p> <p>coupling one or more sensor modules to the estimation module, each associated with a</p> | <p>At least under Plaintiffs’ apparent infringement theory, Welch 1997 discloses, either expressly or inherently, a method of using multiple sensors in a tracking system comprising: providing an estimation module; coupling one or more sensor modules to the estimation module, each associated with a different set of one or more sensors; configuring the tracking system, including providing configuration information from each of the sensor modules to the estimation module regarding the characteristics of the sensors associated with the sensor module, and configuring the estimation module using the provided configuration information; maintaining estimates of tracking parameters in the estimation module, including repeatedly passing data based on the estimates of the tracking parameters from the estimation module to one or more of the sensor modules, receiving from said one or more sensor modules at the estimation module data based on measurements obtained from the associated sensors, and the data passed to the sensor modules, and combining the data received from said one or more sensor modules and the estimates of the tracking parameters in the estimation module to update the tracking parameters..</p> |

## Exhibit D-16

| CLAIM 47  | InterSense IS-900   |
|---|---|
| <p>different set of one or more sensors;</p> <p>configuring the tracking system, including</p> <p>providing configuration information from each of the sensor modules to the estimation module regarding the characteristics of the sensors associated with the sensor module, and</p> <p>configuring the estimation module using the provided configuration information;</p> <p>maintaining estimates of tracking parameters in the estimation module, including repeatedly</p> <p>passing data based on the estimates of the tracking parameters from the estimation module to one or more of the sensor modules,</p> <p>receiving from said one or more sensor modules</p> | <p>In the alternative, this element would be obvious over Welch 1997 in light of the other references disclosed in Defendants' Invalidity Contentions and/or the knowledge of one of ordinary skill in the art.</p> <p><i>See</i> Disclosures with respect to Claim 1, <i>supra</i>; <i>see also</i> Defendants' Invalidity Contentions for further discussion.</p> |

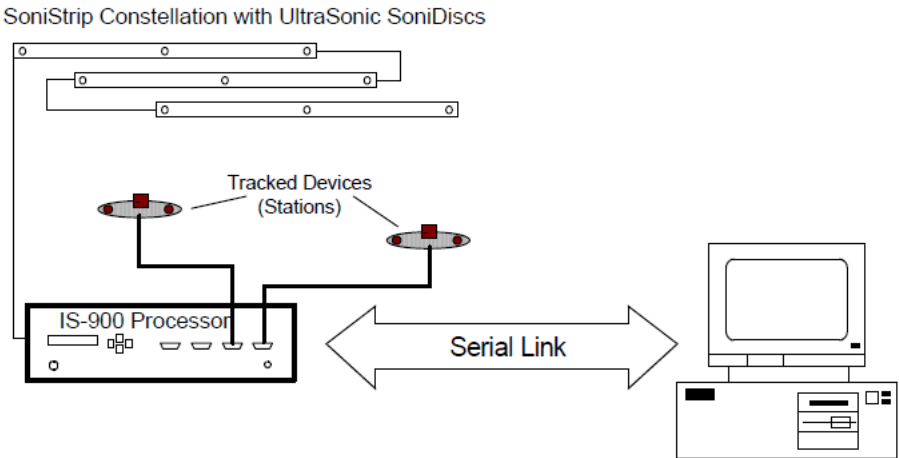
## Exhibit D-16

| CLAIM 47   | InterSense IS-900 |
|--|-------------------|
| <p>at the estimation module data based on measurements obtained from the associated sensors, and the data passed to the sensor modules, and</p> <p>combining the data received from said one or more sensor modules and the estimates of the tracking parameters in the estimation module to update the tracking parameters.</p> |                   |


**L. DEPENDENT CLAIM 50**

| CLAIM 50   | InterSense IS-900  |
|--|--|
| <p>[50] The method of claim 47 wherein providing the estimation module includes providing a module that is configurable to use different sets of sensor modules coupled to it.</p> | <p>At least under Plaintiffs' apparent infringement theory, InterSense IS-900 discloses, either expressly or inherently, the method of claim 47 wherein providing the estimation module includes providing a module that is configurable to use different sets of sensor modules coupled to it. In the alternative, this element would be obvious over InterSense IS-900 in light of the other references disclosed in Defendants' Invalidity Contentions and/or the knowledge of one of ordinary skill in the art.</p> <p><i>See, e.g.:</i></p> |

## Exhibit D-16

| CLAIM 50 | InterSense IS-900  |
|----------|--|
|          | <p style="text-align: center;"><b>IS-900 Technical Overview</b></p> <p><b>System Components &amp; Configuration</b></p> <p>Figure 1 illustrates the configuration of the hybrid inertial-acoustic tracking system. The IS-900 hardware is made up of SoniStrips™, Tracked Devices or Stations, and the Processor Unit. The drawing illustrates the IS-900 being used to track two inertial/acoustic devices. The SoniStrip constellation transmits 40 kHz ultrasonic signals that are received by the tracked devices. The inertial component in the tracked station calculates orientation and position updates. The acoustic components prevent drift accumulation to provide full 6-DOF data sent out via an RS-232 connection.</p>  <p style="text-align: center;"><b>Figure 1 – IS-900 HW diagram</b></p> <p>The IS-900 has expansion capability up to 4 tracked stations. Since each tracking station is pre-configured, your IS-900 automatically registers each station type and its physical connection to the IS-900 base processor upon power up. The IS-900 SoniStrips are designed for mounting above your tracked space in flexible configurations to allow use in a wide variety of large area tracked environments.</p> |

## Exhibit D-16

| CLAIM 50 | InterSense IS-900   |
|----------|---|
|          | <p><b>IS-900 Processor</b></p> <p>The IS-900 Processor uses specialized firmware to control several independent microprocessors used throughout the system. Shown in Figure 2, the Processor has four front panel inputs for tracked stations, a front panel LCD status indicator, and four back panel SoniStrip hub connections (to support a total of 48 SoniDiscs). A SoniStrip Expansion hub can be added for additional SoniStrips</p>  <p style="text-align: center;">Figure 2 – IS-900 Processor</p> <p>InterSense IS-900 Ex. 2 at 2.</p> <p><i>See</i> Disclosures with respect to Claim 47, <i>supra</i>; <i>see also</i> Defendants’ Invalidity Contentions for further discussion.</p> |

**M. DEPENDENT CLAIM 51**

| CLAIM 51   | InterSense IS-900  |
|--|--|
| <p>[51] The method of claim 47 wherein maintaining estimates of the tracking parameters in the estimation module includes using a stochastic model in the estimation module.</p> | <p>At least under Plaintiffs’ apparent infringement theory, InterSense IS-900 discloses, either expressly or inherently, the method of claim 47 wherein maintaining estimates of the tracking parameters in the estimation module includes using a stochastic model in the estimation module. In the alternative, this element would be obvious over InterSense IS-900 in light of the other references disclosed in Defendants’ Invalidity Contentions and/or the knowledge of one of ordinary skill in the art.</p> <p><i>See, e.g.:</i></p> |



## Exhibit D-16

| CLAIM 51 | InterSense IS-900  |
|----------|--|
|          | <p><b>Brief Introduction &amp; Synopsis of the Operation of the IS-900</b></p> <p>The InterSense IS-900 Motion Tracking System, commercially introduced in 1999, was developed in conjunction with a Navy SBIR program. To date, there are over 500 IS-900 systems in the field today with the majority of applications found in the military sector (flight simulators, weapon training systems, etc.), industry (oil &amp; gas, automotive) and university research labs.</p> <p>The system is a 6 degree of freedom motion (6-DOF) tracking system based on a hybrid technology of inertia and ultrasonic tracking. The position and orientation of the tracking stations are determined by the output of the accelerometers and gyros. Drift correction is accomplished in our advanced kalman filter by fusing the output of the inertial sensors with range measurements obtained from the ultrasonic components. The result is full 6-DOF data that is very smooth, precise, and free from jitter.</p> <p>Advantages of the IS-900 technology include:</p> <ul style="list-style-type: none"> <li>- Immune to metallic, acoustic, and optical interference</li> <li>- Sensor design eliminates acoustic transmitter “line of sight” blockage</li> <li>- Consistent accuracy over entire tracking volume</li> <li>- Applications range in size from small cockpit simulators to large broadcast studios</li> <li>- One-time system calibration performed during initial installation with accurate position mapping of acoustic transmitters</li> <li>- Superior motion prediction algorithms</li> <li>- Wireless tracking devices</li> <li>- Integration of tracking devices into OEM applications</li> </ul> <p>InterSense IS-900 Ex. 2 at 1.</p> <p><i>See Disclosures with respect to Claim 47, supra; see also Defendants’ Invalidity Contentions for further discussion.</i></p> |

## N. DEPENDENT CLAIM 52

| CLAIM 52   | InterSense IS-900  |
|--|--|
| [52] The method of claim 51 wherein using a stochastic model includes implementing some or all of a Kalman | At least under Plaintiffs’ apparent infringement theory, InterSense IS-900 discloses, either expressly or inherently, the method of claim 51 wherein using a stochastic model includes implementing some or all of a Kalman filter in the estimation module. In the alternative, this element would be obvious over InterSense IS-900 in light of the other references disclosed in Defendants’ Invalidity Contentions and/or the knowledge of one of ordinary skill in the art. |

## Exhibit D-16

| CLAIM 52                         | InterSense IS-900   |
|----------------------------------|---|
| filter in the estimation module. | <p><i>See, e.g.:</i></p> <p><b>Brief Introduction &amp; Synopsis of the Operation of the IS-900</b></p> <p>The InterSense IS-900 Motion Tracking System, commercially introduced in 1999, was developed in conjunction with a Navy SBIR program. To date, there are over 500 IS-900 systems in the field today with the majority of applications found in the military sector (flight simulators, weapon training systems, etc.), industry (oil &amp; gas, automotive) and university research labs.</p> <p>The system is a 6 degree of freedom motion (6-DOF) tracking system based on a hybrid technology of inertia and ultrasonic tracking. The position and orientation of the tracking stations are determined by the output of the accelerometers and gyros. Drift correction is accomplished in our advanced kalman filter by fusing the output of the inertial sensors with range measurements obtained from the ultrasonic components. The result is full 6-DOF data that is very smooth, precise, and free from jitter.</p> <p>Advantages of the IS-900 technology include:</p> <ul style="list-style-type: none"> <li>- Immune to metallic, acoustic, and optical interference</li> <li>- Sensor design eliminates acoustic transmitter “line of sight” blockage</li> <li>- Consistent accuracy over entire tracking volume</li> <li>- Applications range in size from small cockpit simulators to large broadcast studios</li> <li>- One-time system calibration performed during initial installation with accurate position mapping of acoustic transmitters</li> <li>- Superior motion prediction algorithms</li> <li>- Wireless tracking devices</li> <li>- Integration of tracking devices into OEM applications</li> </ul> <p>InterSense IS-900 Ex. 2 at 1.</p> <p><i>See</i> Disclosures with respect to Claim 51, <i>supra</i>; <i>see also</i> Defendants’ Invalidity Contentions for further discussion.</p> |

**O. DEPENDENT CLAIM 53**

| CLAIM 53  | InterSense IS-900  |
|---|--|
| [53] The method of claim 52 wherein implementing some or all of the Kalman filter | At least under Plaintiffs’ apparent infringement theory, InterSense IS-900 discloses, either expressly or inherently, the method of claim 52 wherein implementing some or all of the Kalman filter includes updating error estimates using linearized models of the sensor system. In the alternative, this element would be obvious over InterSense |

## Exhibit D-16

| CLAIM 53  | InterSense IS-900   |
|---|---|
| includes updating error estimates using linearized models of the sensor system. | <p>IS-900 in light of the other references disclosed in Defendants' Invalidity Contentions and/or the knowledge of one of ordinary skill in the art.</p> <p><i>See</i> Disclosures with respect to Claim 52, <i>supra</i>; <i>see also</i> Defendants' Invalidity Contentions for further discussion.</p> |

**P. DEPENDENT CLAIM 59**

| CLAIM 59  | InterSense IS-900  |
|---|--|
| [59] The method of claim 47 wherein providing configuration information from the sensor modules includes providing information characterizing a type of a sensor associated with a sensor module. | <p>At least under Plaintiffs' apparent infringement theory, InterSense IS-900 discloses, either expressly or inherently, the method of claim 47 wherein providing configuration information from the sensor modules includes providing information characterizing a type of a sensor associated with a sensor module. In the alternative, this element would be obvious over InterSense IS-900 in light of the other references disclosed in Defendants' Invalidity Contentions and/or the knowledge of one of ordinary skill in the art.</p> <p><i>See</i> Disclosures with respect to Claim 47, <i>supra</i>; <i>see also</i> Defendants' Invalidity Contentions for further discussion.</p> |

**Q. DEPENDENT CLAIM 60**

| CLAIM 60  | InterSense IS-900  |
|---|--|
| [60] The method of claim 47 wherein providing configuration information from the sensor modules includes providing information characterizing a position or an orientation of a | <p>At least under Plaintiffs' apparent infringement theory, InterSense IS-900 discloses, either expressly or inherently, the method of claim 47 wherein providing configuration information from the sensor modules includes providing information characterizing a position or an orientation of a sensor associated with a sensor module. In the alternative, this element would be obvious over InterSense IS-900 in light of the other references disclosed in Defendants' Invalidity Contentions and/or the knowledge of one of ordinary skill in the art.</p> <p><i>See</i> Disclosures with respect to Claim 47, <i>supra</i>; <i>see also</i> Defendants' Invalidity Contentions for further discussion.</p> |

## Exhibit D-16

| CLAIM 60                                | InterSense IS-900 |
|---|-------------------|
| sensor associated with a sensor module. |                   |

**R. DEPENDENT CLAIM 61**

| CLAIM 61  | InterSense IS-900  |
|---|--|
| [61] The method of claim 47 wherein providing configuration information from the sensor modules includes providing information characterizing one or more calibration parameters of a sensor associated with a sensor module. | <p>At least under Plaintiffs' apparent infringement theory, InterSense IS-900 discloses, either expressly or inherently, the method of claim 47 wherein providing configuration information from the sensor modules includes providing information characterizing one or more calibration parameters of a sensor associated with a sensor module. In the alternative, this element would be obvious over InterSense IS-900 in light of the other references disclosed in Defendants' Invalidity Contentions and/or the knowledge of one of ordinary skill in the art.</p> <p><i>See</i> Disclosures with respect to Claim 47, <i>supra</i>; <i>see also</i> Defendants' Invalidity Contentions for further discussion.</p> |